

AN EXPERIMENT IN CLASS-INSTRUCTION
VERSUS INDEPENDENT-STUDY AT
COLLEGE LEVEL

BY

GENEVIEVE RYAN

A DISSERTATION

submitted to the Advisory Board of the School of Higher Studies in
Education of The Johns Hopkins University in conformity
with the requirements for the degree of

DOCTOR OF EDUCATION

1932

BALTIMORE, MARYLAND

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BALTIMORE, MD.



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CHAPTER I

INTRODUCTION

The College is the link in the American educational ladder which renders possible the coordination of the high school and the graduate field. It prepares the way for future efforts in higher education or in the vocation to which the individual is called immediately after his college career. Consequently, it is incumbent upon the college to afford a training liberal enough to provide the necessary background, and at the same time sufficiently specialized to meet the individual student's needs. Generally speaking, the first two years are devoted to the liberalizing process; the third and fourth to specialization. In order to realize this two-fold purpose for which the college exists, attention should be centered upon the student as an individual, rather than upon the curriculum or the instructor.

Throughout the entire field of education, recognition of individual differences has resulted in radical changes in methods of instruction in vogue during the nineteenth century. Recent questioning of college tradition has led to experimentation in methods to further the intellectual life of the student and to make him capable of thinking in life situations. Orientation courses in the first and second years to provide general background, and comprehensive examinations at the close of the third and fourth years during which time some type of honors courses has been followed, have gained in popularity during the past decade. Since efforts to individualize instruction in behalf of the undergraduate are the points at issue, the mention of survey courses is sufficient, but further consideration should be given to the various means adopted by the college to provide for the intellectual needs of the gifted.

From the English idea of honor and pass students, systems providing for progress of the superior student at his own rate of speed have been introduced into the American college.

Since each college has its own peculiar problems and its own resources upon which to rely for their solution, it seems advisable to review briefly typical plans which have been more or less successful and which may be modified as necessity requires in order to provide for individual differences.

Illustrative of the Preceptorial System is Princeton; of Honors Courses, Swarthmore; of the Tutorial Plan, Harvard, and of the more recently favored Independent-Study Plan, Columbian College. These plans, regardless of the way in which they function, tend ultimately toward increased intellectual power. Consequently, they presuppose on the part of the student, a certain degree of intellectual maturity, mental fertility, a keen sense of discrimination and an inquisitive attitude of mind, coupled with resourcefulness, reliability and steadfastness of purpose. In view of such qualifications required of students, ventures in honors courses have been reserved for junior and senior years, for students who during the first two years of college have given authorities reason to believe they are capable of independent-study.

A second common characteristic of honors courses is the marked tendency to stress some form of comprehensive examination as a determinant of the scholarship of the applicant for the degree with honors. Such testing is as a rule, not confined to one course, or to one phase of a subject, but is inclusive of the field of study. At the close of senior year when opportunity has been afforded to read and assimilate sufficiently, the comprehensive test is administered in order to estimate the progress which has been made. Although the plans selected as typical of American means of providing for the superior students at college level are similar in respects such as these, each system has its own distinctive features which are worthy of note.

THE PRECEPTORIAL SYSTEM

For the past quarter of a century Princeton has offered preceptorial instruction to groups ranging from six to eight in number. The purpose has been to discuss in conference

books assigned as collateral reading along with the regular course. Lately, application of the processes learned in preceptorial conference and the organization of material without the aid of the usual lecture have been attempted. The general procedure includes the presentation of the material in lecture, followed by preceptorial conference in which the student forms his attitude toward the subject in question, and finally, after study, the student's presentation of the results of the research to the preceptor and the members of the group.

At graduation the student is equipped not only with a liberal knowledge based on general courses, but with a certain degree of mastery of a special field. The comprehensive examinations which precede the completion of the work show that such study results not in a mere assemblage of facts or in a mere overcrowding of memory, but develops judgment in the selection and organization of knowledge.

HONORS COURSES

In common parlance the term, "honors groups," refers to carefully selected students who are relieved from attendance at lectures and regular class conferences. They are allowed to read independently under the guidance of professors, or to read and then discuss the material at conference. Such is the preparation for the final examination at the close of senior year.

At Swarthmore, these courses, termed "Reading for Honors" have, since 1922, included ten divisions of related studies, covering practically every department of the College. Reading in a well-defined field under the guidance of the head of the division; meetings twice a week with groups of five or six honor students for the purpose of reading and discussing problems, constitute the work of junior and senior years. Eight to ten three-hour written examinations and a public oral examination conducted by outside professors conclude the study. This plan tends toward the acquisition of a general cultural background with an additional extensive

outlook on the student's particular field, in a manner adapted to the needs of the one in question.

THE TUTORIAL PLAN

Prior to Swarthmore's venture in "Reading for Honors," Harvard in 1911, adopted a general final examination. As it has been developed at Harvard, the honors course involves for graduation a general examination in a fairly wide field of the student's choice. Based upon the principle that competition is more respected where everyone participates, substantially all three students are required to take the honors course. The identity of the curriculum for both "pass" and "distinction" men is an important feature of the arrangement. Those seeking distinction must present a thesis during the last year. The candidate registers to that effect when his curriculum is in the making. Many however, who have this end in view in the outset, seek the lower group, while the timid and indifferent are spurred on later to make efforts. To discover the aptitude of his charges and to direct the honors work, the tutor has been called into service.

At the close of Freshman year, the undergraduate is assigned to a tutor who normally remains with him until graduation. Surveying the field with the mature Freshman the tutor helps in the planning of a curriculum, consisting not only of a general program of courses, but of a gradually built-up syllabus covering the whole field for the remaining three years. With such aid, the student is encouraged to correlate his work, review his own courses, visit others, attend lectures and read independently. In the last two or three years cessation of courses and lectures for three or four weeks prior to examination has been adopted to allow students to pursue their own interests and to explore independently.

The tutor at Harvard is a professor with tutoring as a function rather than as an office. Close personal contact with his charge allows stimulation of interest, of intellectual ambition and curiosity, and the direction of the individual's activities. The plan for Houses as residential units is also a

recent movement on the part of Harvard to further the intellectual interests of the students. The selection of students for the Houses, the cooperation of the Masters in affording and establishing proper relationships between tutors and students, and the cross-sectioning of the whole residential membership of the College, have in view the stimulation of intellectual tastes and aspirations.

THE INDEPENDENT-STUDY PLAN

The recent reorganization of George Washington University, comprising a Junior College, Columbian College and the Graduate School set the stage for an experiment in Independent-Study as a new feature of junior and senior years, leading to a Bachelor's Degree, and the year of advanced work prior to the Master's, which are now offered at Columbian College. This change is significant and typical of the reorganization which is rapidly taking place in colleges throughout the country. Subjects are ordered in related groups with the department of instruction in four organized divisions: of Languages and Literatures; of Mathematics and the Physical Sciences; of the Natural Sciences and of the Social Sciences.

The basic idea underlying independent-study is that of the Guild System, the intimate relation of "master" and "fellow." Its primary aim is to allow students who are qualified to profit by exemption from formal course requirements to do original work under guidance. While the development of exceptional ability or of marked interest is hereby encouraged, the Plan is not limited to students who are brilliant or who make high marks. The project is open to the creative mind and at Columbian may be undertaken in any one or more of the courses with the approbation of the instructor who is acquainted with the calibre of the applicant and the resources at his disposal both as to time and material.

Experiments in plans such as those cited, which tend to break away from the rigid lock-step order of the nineteenth century, are too numerous for an exhaustive and detailed study. A survey of activities at college level which stress

progress of the individual at his own rate, reveals the fact that progressive colleges at present, in accordance with their peculiar needs and resources whereby such wants may be satisfied, are questioning traditional class-instruction methods. Provisions more or less elaborate have been made for individual differences in the hope of realizing in the rising generation quality of learning rather than quantity of facts remembered.

A complete treatment of attempts to adapt college instruction to the needs of the superior student is beyond the scope of this discussion. One of the most significant features of the movement is, perhaps, the wholehearted interest manifested by the college faculty in devising plans whereby the student may be brought to the recognition of the value of intellectual culture and to the realization that constant, personal effort is essential for its attainment. Willingness to engage in progressive experiment rather than to view pioneer efforts of the past as perfected achievement, is the attitude of college authorities upon which rests the vital issue of the quality versus quantity objective of higher education.

CHAPTER II

THE PROBLEM

From a consideration of the efforts which are being exerted in behalf of the college student, it is evident that controlled experimentation in methods of conducting college classes is necessary. The value of class attendance at lectures or for discussion of subject-matter previously assigned, in which mediocre, average and superior students are invited to participate in the same intellectual fare, has been questioned within the past two decades. Present favor of orientation courses, of preceptorial plans, of tutorial systems and even more recently of independent-study, has enabled the talented individual to progress at his own rate, and by development of initiative and self-reliance, to exercise qualities of leadership which under the old regime met with the possibility of remaining dormant.

In striking contrast today to the student clientele of a few years ago is our college population. Not only the selective group destined for leadership, but also individuals, bordering on mediocrity, and many of average standing find their way to college,—many of them eager to explore the depths of knowledge consistent with their abilities and interests, with a view of future service to society in their chosen fields. Interest then, not in the gifted alone, but in every individual desirous of accepting the opportunity of a college education, prompted the question: "Is the independent-study plan or the class-instruction method better adapted to meet the needs of students at college level?"

Obviously, there can not be a definite answer which will prove true in every instance. Even if data were available, purely objective in nature, and sufficient to establish the superiority of one method rather than another, would not a variety of factors, such as differences among teachers and students, the broad scope of subjects in the curriculum, and

other equally effective variables, modify the most objective evidence, at least in certain circumstances?

Despite the difficulties involved in determining the efficacy of methods of teaching, relative values may be weighed to advantage in the light of carefully controlled experiment. Review of present tendencies in higher education and of procedures in behalf of the gifted, and reflection upon the possibilities in independent-study for students of varied intellectual calibre, terminated in the following hypothesis: "Undergraduate students, properly motivated and presented with a unit of instruction, will accomplish more by the independent-study plan than by the class-instruction method."

Definition of the terms of this hypothesis is needed to establish the difference between independent-study as it is usually conceived and as it is interpreted in this study. Undergraduate students included forty Freshmen who were nearing the close of their first year of college English, thirty Sophomores and forty Juniors. The experiment begun with these groups in the latter part of the spring term of 1931, was continued during the fall term of 1931-1932. In consequence, the second, third and fourth years of college work followed by these groups as Sophomores, Juniors and Seniors respectively, were open to observation. Thus the four levels of college work were represented instead of the usual plan of confining independent-study to the third and fourth years.

Again, the students were not limited to the superior group, but were typical of the varying degrees of mentality found in the college in which the investigation was undertaken.

Independent-study was used as a method, and did not result in any reorganization of the curriculum. It did not extend to any one field of study, such as English, or Education, nor to a complete course in any subject. It was rather a selection of special units of instruction, such as History of Education, Ancient, with a view to studying the effect of exemption from class upon groups representative of varied undergraduate ability. Units chosen for the experiment were of such a nature as to admit of class-discussion and of inde-

pendent-study. Students engaged in the latter method were exempted from class attendance only in the subject in question, and followed the usual class-instruction in other subjects.

An important feature of the experiment was the unit-arrangement of subject-matter. Outlines of the topics to be treated were presented to each group; i.e., experimental and control, at the beginning of each unit. Consequently, the subject-matter covered by each section was identical; the method, different. The essential difference between independent-study and class-instruction was exemption of the former group from class attendance with freedom to consult the instructor in conference during two hours a week.

The original aims of the experiment, retained throughout, were:

- I. To study the relative values of the independent-study method and the class-instruction method at college level.
- II. To discover at what grade of undergraduate work exemption from class attendance is advisable.
- III. To ascertain the efficacy of the methods from the point of view of time required by the students in preparation of the given unit, and by the instructor in individual counseling versus mass instruction.

Results of the study have been interpreted in the light of this three-fold aim. Objective data have been examined for possible scientific value, and personal experience of participants has been treated in order that workers in kindred undertakings may profit thereby. Since an investigation of this type unearths other problems, there has been an attempt to record such as have been observed, the solution of which should lead to improvement in methods of teaching in college.

CHAPTER III

PROCEDURE

SELECTION OF STUDENTS

With the three-fold objective in view, namely (1) to study the relative values of independent-study and class instruction at college level; (2) to discover at what grade of undergraduate work, exemption from class attendance is advisable; and (3) to ascertain the efficacy of the methods from the point of view of time required in student-preparation of work, and in teacher's mass instruction versus individual counseling, three college classes were selected for controlled experiment. Owing to the heterogeneity of Freshmen entering in September and to the need of their adjustment to college environment, it was decided in the formulation of the plan, to include in the study only students of Sophomore, Junior and Senior rank. But since a favorable opportunity of beginning the experiment during the latter part of the spring term of 1931 presented itself, choice was made of forty Freshmen in English Literature, as a fair sampling of ability to study independently near the close of the first year of college work. In view of their early promotion to Sophomore level, and to avoid complexity of arrangement and possible confusion in the presentation of results, these students will be referred to throughout the experiment as Sophomores.

At the same time and in a similar manner, forty Sophomores were selected for Unit I. Student mortality at the end of Sophomore year necessitated the reduction of this group to thirty. The second group, Sophomores in the beginning, will be designated as Juniors, since the major portion of their study was undertaken at third year level. The Senior class, beginning independent-study as Juniors, constituted the third group, numbering forty students.

Each class was divided into two sections, Section I, Experimental, i.e., Independent-study and Section II, Control, or

Class-Instruction. Members of each group were paired according to rank in the Thurstone Psychological Examination, 1930 Edition. Since rotation was planned for the end of each unit, further equating of groups was deemed unnecessary. A college instructor was assigned to each class; to Section I, as Counselor; to Section II, as Instructor.

Although the students selected for the experiment were small in numbers, the consideration that each instructor assumed responsibility for conference with fifteen or twenty individuals in addition to mass instruction to a group of equal size was of no slight importance in regard to the teaching load.

DESCRIPTION OF METHODS

The experimental group was exempted from class attendance with freedom to consult the instructor during two hours a week at a time definitely scheduled for conference. The students were at liberty to come either individually or in small groups. The control section attended class two hours a week, during which the lecture-discussion method was employed to cover the same material which had been assigned to independent-study students. Guide sheets, containing an outline of the unit and suggestive questions, were distributed to both groups at the outset. In Section I, responsibility for reading and for organization of matter was placed upon each individual, whereas, in Section II the subject-matter was prepared as usual in daily assignments for class recitation. A basic text was used, supplementary material was given in lecture form by the instructor, and from time to time, students reported orally on topics especially assigned to them.

Readings in each group, whether from the text or from references were entered on small library cards. Records bore the name of the student, the author read, the title of the book or article, the pages, the date and the time spent. The readings were approved by the instructor and filed. An account of time devoted to study by members of each group was kept.

In addition to the required work on the unit of instruction, a problem was assigned at the beginning of each unit to the experimental and to the control group. Students were requested to survey the unit and at the end of the week to submit a subject relative to, but not contained in the outline presented for study. Suggestions of topics of interest to the students concerned were accepted, and at the close of the first week, three or four problems were listed and a week allowed for each student to decide upon her "project" for the unit in question. Readings on the subject elected were recorded by students in the same manner as the other readings. One week before the project was due, outlines for the proposed paper were submitted. These requirements were a check upon procrastination which all too frequently characterizes the undergraduate.

In rating the problems, consideration was given to evidence of research as shown in the readings and bibliography, to the exercise of judgment in the choice of material, to originality in presentation of the results of the investigation and to the form and general appearance of the paper. In order to establish as far as possible, a degree, at least, of objectivity in scoring the problems, the class president of each group assigned a number to each individual before the latter submitted her choice of problem. The instructors were thus at a loss to know the authors of the papers, (since presentation of the problem was typewritten) until the marks were announced. This device not only aroused interest on the part of the students, but also served in some instances to tempt habitually careless individuals to surpass their own former efforts.

A description of the methods would be incomplete if consideration were not given to the conference which is a salient feature of independent-study. The instructor, regardless of patronage, was present during two hours each week, appointed for conference. Unlike this feature in many plans for individual differences, the conference was entirely optional. Students were not encouraged to come unless there were difficulties, yet assurance was given that anyone or any

group of students desiring assistance would be welcome. The prime object of the conference was to afford students an opportunity of presenting difficulties encountered in the study of the unit.

The essential difference between the independent-study group and the control group in this experiment was the method of learning employed. The same unit of instruction was studied by each group during a period of six weeks. Each group used the same outline, and prepared for the same tests. In the control group, there were two hours per week of class attendance with recitation upon the section of the outline assigned for the day; whereas, in the experimental section, the students having received the outlines at the beginning of the unit, were entirely exempted from class attendance, but retained the privilege of consulting the counselor during two hours a week designated for conference.

The methods described were employed with three groups, each group covering three distinct units of instruction. Rotation of sections at the close of each unit allowed each student the opportunity of two units of class-instruction and one of independent-study; or one of class-instruction and two of independent-study.

Inasmuch as the members of the control and experimental groups were given the same material, the question of transfer of class proceedings to the independent-study group was advanced. Consequently, in order to observe the effects of exempting an entire group from class, after each section had one opportunity with each method, the Seniors in Unit III, were all required to follow the work by independent-study. The results of this unit then, show the effects of independent-study without the possibility of transfer of class instruction. There is, of course, no control group for this unit. Although many factors other than the method of study may have entered to produce the results recorded for this unit, it is evident that so far as actual group averages are concerned whatever was achieved must be attributed to independent-study.

CRITERIA FOR ESTIMATING RESULTS

Before the study was begun, certain criteria were determined whereby the relative achievement of the two groups could be estimated. An objective test alone seemed inadequate, especially since such a subject as English Literature, which undoubtedly involves appreciation, was concerned. Accordingly, the following criteria were established as bases for estimating results:

1. An objective pre-test was given to each group prior to the study of each unit.
2. A comprehensive, objective test on the unit, indential with the pre-test, was given at the completion of each unit of instruction.
3. Essay type questions, covering approximately the same material as that of the objective test, yet affording an opportunity of discussing the matter at issue, were used.
4. The results of the problem previously mentioned were an additional criterion.
5. The time spent by the experimental group in reading and in conference was compared with the time spent by the control group in reading and in class attendance.

Originally an oral examination was planned, but the subjective element in a test of this nature did not warrant its use as a criterion. The results interpreted in the following chapter are the outcome of the application of the five criteria to each unit of instruction.

UNITS OF INSTRUCTION

To confine a study of the relative value of methods to one subject of instruction only would lead to a new variable and inevitably to the question: Of what value is the preferred method in other subjects? Moreover, every subject does not lend itself equally well to unit organization and to independent-study. Accordingly, in the initial attempt at independent-study as a method versus class-instruction, choice was made not only of subjects which could be adapted to the two

methods, but also of units of instruction possible for mastery by novices in the method.

Care then, in the choice of content was essential. The following units, providing as wide a range as possible in subject-matter, were organized. Mimeographed outlines were distributed, and after one class period for motivation the independent-study group was freed from responsibility of class attendance, while the control sections undertook the study of the same unit in the usual manner.

SOPHOMORE UNITS

- I. English Literature, April-May, 1931.
A Study of Tennyson and Browning as Representative of Victorian Poets
- II. English Literature, September-November, 1931.
The Novel: Its Development as a Prose Form in English Literature.
- III. English Literature, November-December, 1931.
Intensive Study of the English Victorian Novel, 1780-1900.

JUNIOR UNITS

- I. English Literature, April-May, 1931.
A Contrast Study of the Victorian with the Contemporary Novel and Poetry.
- II. History of Education, Ancient, September-November, 1931.
- III. History of Education, Medieval, November-December, 1931.

SENIOR UNITS

- I. History of Education, April-May, 1931. Modern Education.
- II. Organization and Administration of the Secondary School, September-November, 1931. The Role of the Teacher in Organization.
- III. Organization and Administration, November-December, 1931. Teacher-Pupil Contacts.

CHAPTER IV

RESULTS

The results of this experiment are presented in terms of objective and subjective evidence. The former, obtained by application of the criteria discussed in the previous chapter, represents the findings from a scientific point of view. The latter, derived from the opinion of participants, both instructors and students, offers possible solutions for some of the problems revealed by the objective data, and gives research workers in kindred fields the benefit of the personal experiences of those concerned in the investigation.

The objective evidence in general, may be interpreted in the light of the three-fold end for which the experiment was undertaken, namely, (1) to study the relative values of independent-study and class-instruction for undergraduate students; (2) to consider the level of college work at which exemption from class attendance is advisable, and (3) to compare the two methods from the point of view of economy of time for the student and for the instructor.

When mean achievement alone is considered, in five out of eight units in which the growth of the experimental and of the control is comparable, the class-instruction groups were in advance of the independent-study sections. The differences in the two groups ranged from 2.75 ± 3.37 to 11.75 ± 2.8 . When this measure of growth is viewed in connection with the additional time required by the control groups, the differences in favor of class-instruction are significantly affected. In general, then, so far as actual achievement scores are concerned, the control groups, for the most part, made greater progress, but in so doing, required more time.

The mean scores for each group were tabulated for each of the criteria, for the objective pre-test, for the final objective test, which was identical with the pre-test, for the measure of growth obtained by subtracting the results of the

pre-test from those of the final objective test, for the essay-type examination, for the problem and for the hours spent, —in the control group, in reading and class attendance, and in the experimental, in reading and conference.

The Probable Error of the mean was determined by formula :

$$P E_{\text{mean}} = \frac{.6745}{\sqrt{N}} \sigma$$

For the Probable Error of the Difference, the following formula was used :

$$P E_{\text{diff}} = \sqrt{(P E_1)^2 + (P E_2)^2}$$

A comparison of results of the essay type test and the problem shows no appreciable difference in scores in favor of either method. Inasmuch as the objective test results, minus the score made in the pre-test, in other words, the measure of growth in column III for each class, are the most objective of the criteria, these scores deserve the most attention.

Since the time required by each group is a most important factor, both time and achievement should be regarded in interpreting results. For many reasons a comparison of results in the Sophomore class with those of Junior and Senior groups is impossible. Consequently, attention must be centered on each class separately.

At Sophomore level, the achievement scores in the three units are in favor of class instruction, with the differences, 2.75 ± 3.37 , 11.75 ± 2.8 , and 10.5 ± 2.3 , for Units I, II and III, respectively. Although the difference is significant in the second and in the third instance, the additional time required for these gains lessens their importance. The increase in time of 2.5 ± 1.6 hours for Unit I, of 11.65 ± 1.68 for Unit II, and of 2.0 ± 0.7 , in Unit III, conditions the efficacy of class instruction which the higher achievement scores, when the time element is omitted, warrant.

It is, moreover, worthy of note that the group in control in Unit I, left to their own resources in Unit II, was surpassed by the control group of that particular unit. But when the former group was drawn back into class in Unit III, there was an increase both in achievement and in time spent.

Results in group achievement at Junior level differ from those at Sophomore. They are two to one in favor of independent-study. In each instance where the experimental section is in advance in achievement, there is a significantly less amount of time spent in study. Although the gain in Unit I of 4.14 ± 3.22 is slight and of little import, the fact that it was made in 10.34 ± 3.7 hours less than those required by the control can not be overlooked. This same group in Unit III, in the second trial of the new method is 5.67 ± 1.98 in advance of the control in 5.58 ± 1.2 hours less. The control group of Unit II, which was more successful as experimental in Units I and II, shows a significant gain in achievement over the independent-study section, and this in 9.66 ± 2.03 hours less.

This exception may be due to the superiority of the section. Another possible explanation is the change of subject-matter. In Unit II, at the beginning of the new scholastic year, the Juniors began the study of the History of Education. Not only was this their first experience with this subject, but it was moreover, their initiation into the field of Education. Consequently adaptation to the methods of a different department as well as to a new method of study, (since this was the first attempt of the experimental section of this unit at independent-study), was necessary. Again, from observation of the effort on the part of the experimental group to secure adequate background for the study of ancient educational systems, it seems reasonable to suppose that the class-instruction group should gain more in less time under the direction of an experienced teacher.

Although there is no objective evidence to uphold the opinion, the progress of the control group of Unit II, in attacking by independent-study the Medieval period in Unit

TABLE No. I
RESULTS AT SOPHOMORE LEVEL

UNIT I				UNIT II				UNIT III			
	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.		
Objective Pre-test	17.5 $\pm$ 1.5	12.5 $\pm$ 1.58	5.0 $\pm$ 2.15	4.5 $\pm$ 0.5	7.25 $\pm$ 1.	-2.75 $\pm$ 1.11	18.5 $\pm$ 1.07	22.5 $\pm$ 1.24	-4.0 $\pm$ 1.3		
Final Test Objective	81.75 $\pm$ 1.4	80 $\pm$ 2.15	1.75 $\pm$ 2.56	67. $\pm$ 2.27	76.5 $\pm$ 1.3	-9.5 $\pm$ 2.6	79.25 $\pm$ 1.38	84.25 $\pm$ 1.07	-5.0 $\pm$ 1.74		
Growth Final Pre-test	65.0 $\pm$ 2.05	67.75 $\pm$ 2.67	-2.75 $\pm$ 3.37	59. $\pm$ 2.3	70.75 $\pm$ 1.59	-11.75 $\pm$ 2.8	61. $\pm$ 1.7	71.5 $\pm$ 1.64	-10.5 $\pm$ 2.36		
Essay Type Test	86.25 $\pm$ 1.39	80.25 $\pm$ 1.92	+6.0 $\pm$ 2.36	76. $\pm$ 2.13	77.5 $\pm$ 2.02	-1.5 $\pm$ 2.2	87. $\pm$ 1.46	86.5 $\pm$ 1.52	+0.5 $\pm$ 2.2		
Problem	82. $\pm$ 1.29	82.5 $\pm$ 1.56	-0.5 $\pm$ 2.02	82.5 $\pm$ 1.04	84.5 $\pm$ 0.81	-2.0 $\pm$ 1.3	84. $\pm$ 0.79	84. $\pm$ 1.19	0. $\pm$ 1.4		
Hours	20.75 $\pm$ 1.12	32.25 $\pm$ 1.12	-2.5 $\pm$ 2.5	30.6 $\pm$ 1.33	42.25 $\pm$ 1.02	+11.65 $\pm$ 1.68	25.75 $\pm$.55	27.75 $\pm$ 0.5	-2.0 $\pm$ 0.7		

III, suggests the possibility at least, that the gain was occasioned in part, or perhaps facilitated by the background and method of attack secured under teacher guidance in Unit II.

At Senior level, there is no appreciable difference in the results of the two methods in Unit I, so far as growth measures are concerned. But there is a significant difference in the time, 6.25 ± 1.2 hours more, required by the control section to achieve approximately the same score. In Unit II, the control group is 10.5 ± 1.8 in advance, but again 6.5 ± 1.07 hours additional, condition the gain.

Unit III of the Senior group does not admit of the same comparison as the others. The question of transfer of content between experimental and control sections resulted in an attempt to evaluate the new method when access to the material given in class was unavailable. The control group was for this reason abandoned in Unit III, Senior. The difference in the mean scores when the results were tabulated in accordance with the original division of the class for Unit I, was 0.5 in favor of the experimental group of the second unit, with however, an additional four and one-half hours of time required. For each group this was the second attempt at independent-study. For one, the first experience was in History of Education, and for the other, in Organization and Administration of the Secondary School. In Unit III, the subject-matter was the same as in Unit II, namely, Organization and Administration. With the same amount of experience in the method, despite the difference in subject-matter in which that experience was gained, the achievement was approximately the same.

Although this is but one instance, it would seem that the value is in the method itself, at least in regard to the subjects concerned in this study. While there may be many causes to which the increase in achievement in Unit III may be attributed, it is obvious that there was no transfer from class-instruction, and whatever was gained was the result of the independent-study method. In consequence of the lack of a

TABLE No. II
RESULTS AT JUNIOR LEVEL.

UNIT I				UNIT II				UNIT III			
	Experimental Mean	Control Mean	Diff.	Experimental Mean	Control Mean	Diff.	Experimental Mean	Control Mean	Diff.		
Objective Pre-test	13.84 $\pm$ 0.97	19.5 $\pm$ 1.9	-5.6 $\pm$ 2.13	10.83 $\pm$ 1.04	8.5 $\pm$ 0.66	2.3 $\pm$ 1.22	4.83 $\pm$ 0.7	5.83 $\pm$.57	-1.0 $\pm$ 0.9		
Objective T. Final	70.16 $\pm$ 1.48	70.16 $\pm$ 1.9	0. $\pm$ 2.4	79.16 $\pm$ 0.76	85.6 $\pm$ 1.67	-6.4 $\pm$ 1.8	84.5 $\pm$ 1.45	83.5 $\pm$ 1.03	+1.0 $\pm$ 1.77		
Growth Final T. Pre-test	55.84 $\pm$ 1.77	51.7 $\pm$ 2.67	4.14 $\pm$ 3.22	67.5 $\pm$ 1.24	75.5 $\pm$ 1.79	-8.0 $\pm$ 2.17	81.5 $\pm$ 1.60	75.83 $\pm$ 1.17	+5.67 $\pm$ 1.98		
Essay Type Test	82.83 $\pm$ 1.69	78.5 $\pm$ 1.28	4.33 $\pm$ 2.1	78.5 $\pm$ 1.84	83.5 $\pm$ 1.96	-5. $\pm$ 2.7	77.8 $\pm$ 2.09	78.5 $\pm$ 2.24	-6.67 $\pm$ 3.05		
Problem	87.5 $\pm$ 2.01	88.16 $\pm$ 0.69	0.66 $\pm$ 2.1	82.25 $\pm$ 1.11	82.75 $\pm$.99	0.5 $\pm$ 1.2	84.16 $\pm$ 1.35	80.83 $\pm$ 1.34	+3.3 $\pm$ 1.9		
Hours	57.16 $\pm$ 2.59	67.5 $\pm$ 2.65	-10.34 $\pm$ 3.7	46.16 $\pm$ 1.7	36.5 $\pm$ 1.11	9.66 $\pm$ 2.03	25.8 $\pm$ 0.99	31.38 $\pm$ 0.69	-5.58 $\pm$ 1.2		

control group in this unit, a comparison of independent-study and class-instruction is impossible.

Such are the results for each class in the study, deduced from a closely kept record of achievement scores, considered in connection with time spent in preparation. But is the fact that the measures of growth favor class-instruction rather than the new method, indicative of inferiority or independent-study? Evidence gathered in this study is insufficient to answer this question. What the results would have been had the experimental groups spent the same time as the control sections is, at best, speculation.

With the data obtained from the investigation, it is impossible even to estimate accurately the point at which the experimental sections should have arrived in the additional time. Whether the groups progressed rapidly or slowly at first and gained in rate with experience, or whether there was a decline in effort due to exemption from teacher-surveillance in the latter part of the unit which would have rendered additional time of little value, can not be ascertained.

Although the nature of the learning curve involved in each unit can not be determined, an estimate of possibilities for independent-study had the groups engaged therein spent the same amount of time as the control sections, was made. In order to establish the final value set as the score which the experimental sections should have reached to excel the class—instruction groups in achievement, a number four times the probable error of the difference was added to the scores made by the control groups. In Sophomore class, the values thus derived were 93.5, 87.7 and 93.7 for Units I, II and III respectively. These were regarded as the scores needed to prove superiority of the new method in the time spent by those who were attending class. The curves fitted to these data represent the hypothetical curves by which the experimental groups could reach the desired scores. Since Unit II Sophomore is the only one representative of a logarithmic curve and since the others show a straight line progress, Unit II was selected for graphic representation of pre-

TABLE No. III

RESULTS AT SENIOR LEVEL

UNIT I				UNIT II				UNIT III			
	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.	<i>Experimental</i> Mean	<i>Control</i> Mean	Diff.	<i>Experimental</i> Mean	<i>Control</i> Mean
Objective Pre-test	14. ± 0.82	18. ± 1.28	-4.0 ± 1.5	13.75 $\pm .499$	14.5 $\pm .3$	-75 ± 0.7	15.75 $\pm .8$	12.5 $\pm .97$	3.25 ± 1.27		
Objective T. Final	77.5 ± 1.9	77.5 ± 1.5	0. ± 2.4	73. ± 1.5	81. $\pm .79$	-8.0 ± 2.2	84.25 ± 1.17	83.5 $\pm .88$	0.75 ± 1.4		
Growth Final T. Pre-test	61.75 ± 1.5	61.5 ± 1.9	-25 ± 2.8	56.75 ± 1.95	67.25 $\pm .99$	-10.5 ± 1.8	71.5 ± 1.29	72. ± 1.44	-0.5 ± 1.9		
Essay Type Test	76. ± 2.05	77.5 ± 2.7	-1.5 ± 3.38	80.5 ± 1.55	81.5 ± 1.59	-1.0 ± 2.2	81.25 ± 1.38	84.75 ± 1.39	-3.5 ± 1.9		
Problem	83. ± 0.78	83.25 ± 1.13	-25 ± 1.4	84.5 ± 1.25	82.75 ± 1.22	1.75 ± 1.7	81.25 ± 1.36	82.25 ± 1.33	-1.0 ± 1.9		
Hours	31.5 ± 0.87	37.75 ± 0.84	-6.25 ± 1.2	28. ± 1.0	34.5 ± 0.41	-6.5 ± 1.07	29.5 ± 0.55	34. ± 0.83	-4.5 ± 0.98		

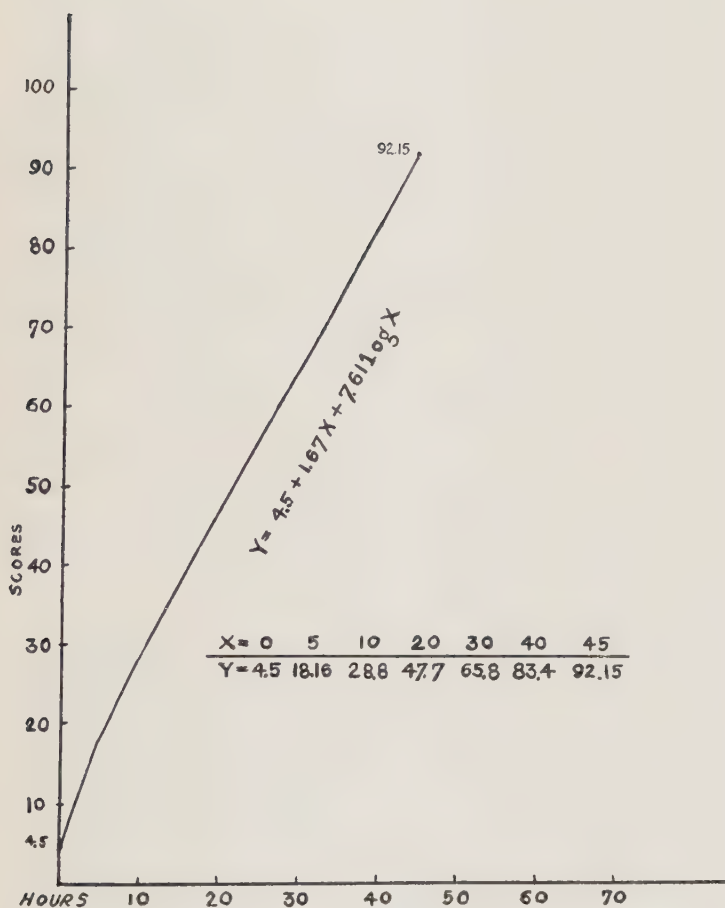
dicted achievement, had the members of the experimental group spent the same time in study as those of the control section.

In Units I and III, the straight line equation, $Y=a+bX$ seemed to be the only simple curve which would satisfy the three given points,—i.e., the initial score, the final score and the “needed” score. In each instance, Y represents the score of the final test; “ a ”, the score of the pre-test, and X , the time. In Unit I, the Sophomores by following a straight line curve of growth should have reached a score of 89.0 in the 32.23 hours required by the control group to make a mean score of 80.0. In Unit III, the score should be 84.0, which approximates the actual score made by the control group.

In Unit II of the Sophomore class, the logarithmic curve, $Y = a + bX + c \log X$, seemed to satisfy the given points. The score predicted in this unit was 80, against the actual achievement of 76.5 of the control group in the same time, 42.25 hours. It is evident in this case also that the relationship approximates a straight line.

Similar assumptions were made at Senior level for Units I and II. The scores set for these units were 88.7 against an actual 77.5 made by the control group in 37.78 hours; and 82.5 against an actual 81.0 in 34.5 hours. These measures were undertaken as the nearest possible approach to ascertaining the degree of superiority of the new method. The results should be regarded as assumptions, not facts.

Is it however, reasonable to suppose that a straight line curve of learning was followed for thirty or thirty-five hours and that the same average rate would have been maintained for the following five or six? It is possible that, owing to the novelty of the method and freedom from class attendance, with the desire to excel those in class and other attendant circumstances which might serve as motivation, that the group entering wholeheartedly into the unit by the new method, made rapid strides during the early and even the later hours of the study. On the other hand, there is



SOPHOMORE: UNIT II. PREDICTED ACHIEVEMENT
OF EXPERIMENTAL GROUP IN 42.25 HOURS.

the probability that the novelty of the independent-study and the trial-and-error element which frequently accompanies the unfamiliar, resulted in loss rather than in progress in the beginning. Experience in the new method might have led to more rapid strides later on which compensated for the early retardation. In such an event, the additional hours, owing to experience, might have been even more productive than the early hours spent in building up a technique of study.

These are the extremes, between which there is a wide range of possibilities, capable of affecting either favorably or unfavorably the direction of the learning curve. It is hardly possible to conceive of a straight line path as a general one for either group throughout the entire unit. In the experimental sections where so many adjustments were necessary, the straight line tendency seems out of the question.

Since the measurement of actual results ceases with the attainment made in the objective test, any consideration beyond that point must be regarded as hypothetical. Consequently, the measures adopted to estimate the possibilities for independent-study should be regarded as the most optimistic point of view rather than the expected outcome.

The second objective of this experiment was to discover at what level of undergraduate work exemption from class attendance is advisable. Since there was a group representative of Senior, Junior, Sophomore and Freshman levels, and since there was within each group a fair sampling of the varying degrees of ability within the college in question, there was an opportunity to observe the number of gains and losses in achievement by independent-study of superior, average and mediocre students in each class. The following procedure was adopted as the most satisfactory means of answering this two-fold question.

The students were listed in their original order ; i.e., according to scores made in the Thurstone Psychological Examination, 1930 Edition ; the achievement scores made in each unit were entered for each group. Opposite these achievement scores, the gains and losses in points, determined by

subtracting the achievement score of the control unit from the achievement score of the experimental unit, were recorded.

In attempting to determine the gains in this manner, it was realized that the number of points of gain and loss is not absolute increase or decrease. The variety of subject matter and the relative difficulty of different units for the students in question; a change in instructor or other factors too numerous to mention, may have affected the raw scores as to the meaning of a gain of twelve or fourteen points. But the means selected seemed the best to secure an estimate of the number of students who profited by the independent-study method, as well as to determine the distribution of these gains in regard to superior, average and mediocre students.

The following table contains a summary of the results of this procedure:

TABLE No. IV
NUMBER OF GAINS AND LOSSES IN ACHIEVEMENT
INDEPENDENT-STUDY VS. CLASS-INSTRUCTION

		<i>First Attempt</i>			<i>Second Attempt</i>		
		<i>G.</i>	<i>L.</i>	<i>E.</i>	<i>G.</i>	<i>L.</i>	<i>E.</i>
SENIOR <i>Group of 40</i>	Above Median	6	13	1	<i>Group of 40</i>	16	4 0
	Below Median	7	13	0		10	9 1
JUNIOR <i>Group of 30</i>	Above Median	0	14	1	<i>Group of 15</i>	4	3 0
	Below Median	0	15	0		4	3 1
SOPHOMORE <i>Group of 40</i>	Above Median	13	7	0	<i>Group of 20</i>	3	6 1
	Below Median	4	16	0		0	9 1

G—Gains. *L*—Losses. *E*—Equal.

With the exception of the first attempt of the Junior group, there was a number of gains by students above the median in each instance. The number of gains below median is however, more surprising. Viewed in general, then, the independent-study method may be adapted to students at the four levels of undergraduate work.

At Senior level, in the first and second attempt at independent-study, there was a greater number of gains below

the median score than above it. The increase in the second attempt is noteworthy, and is more significant when one recalls that in the second trial of the new method, the entire group was exempt from class-attendance, and consequently there was no opportunity for transfer of information. Judging from the number of gains below median, it seems that the experimental method might be employed to advantage as a remedial measure for the less efficient but more mature undergraduate.

In contrast with the results in Senior class are those of the Sophomores. In the first attempt made by forty students, there were thirteen gains above median, and four below. In the second attempt which was made by one-half the entire class, while the other half studied as control, the number of gains diminished to three above median, with none whatever below. It may be that the element of maturity is the cause of the decline, and that the first gains were the result of novelty. Further experimentation is necessary however, before a generalization as to the effect of continued exemption from class-attendance at Sophomore level may be made.

The fact that there are no gains in Junior class for the first attempt at independent-study should not of necessity be attributed to inefficiency of the method. In one unit which was used as a gauge of progress, the subject-matter was English Literature, whereas the second was History of Education. One is scarcely justified then, in estimating upon the figures recorded for the first attempt in Junior class. Of the fifteen students who in their second attempt at independent-study prepared the unit on Medieval Education, there were four gains above and four gains below the median score. The group in control for this same unit showed one gain against fourteen losses in independent-study in the unit on Ancient Education. Since this was the initial attempt in the study of History of Education, factors other than method were probably responsible for the loss. This seems to substantiate the belief that a length of time in class-instruction

is of advantage before beginning independent-study in such a subject as History of Education.

From this brief sampling of the independent-study method, the answer to the two-fold question proposed in the beginning of the experiment tends toward the recognition of value in the new method for students at each grade of undergraduate work, as well for the average and mediocre students as for the superior. Further experimentation is necessary to establish the superiority of the new method in this regard, but this initial effort looks encouraging for independent-study as a method, especially for the lower half of the Senior Class.

There is an important consideration in regard to time which was set forth as an objective of the study. In the control sections, students on the whole, spent more time than those engaged in independent-study. The following table presents the time-aspect so far as instructors were concerned. Time for counseling must in each instance be compared with the twelve hours given to mass instruction of the control group.

TABLE No. V
INSTRUCTORS' TIME FOR COUNSELING

	<i>Unit I</i>	<i>Unit II</i>	<i>Unit III</i>
Sophomores _____	12 hrs. 30 min.	3 hrs. 30 min.	2 hrs.
Juniors _____	4 hrs. 30 min.	3 hrs. 30 min.	4 hrs.
Seniors _____	1 hr. 15 min.	1 hr. 40 min.	1 hr. 55 min.

Undoubtedly from the point of view of time required by the instructor, independent-study is more economical. In one unit only, and that incidentally, the first attempt in late Freshman year, was there more time required for counseling than for class-instruction. The time element for the instructors at Sophomore and Junior levels is approximately four to one in favor of counseling. In regard to Seniors there is a notable decrease in comparison with the other classes. In Unit III, Senior, there is only a trifling difference in time asked by forty students and that necessary for half the number in Units I and II. The point at issue here is, not the

saving of time for the instructor, but rather the possibility of employing that time for the interest of the individual student. The wide margin in time required for class and for counseling suggests that students did not avail themselves of the opportunity of conference. This may have been caused by lack of appreciation of its value, or by failure to recognize its need. From observation of the groups concerned, and from statements of students in the experimental groups, achievement in independent-study was somewhat conditioned by failure to make the proper use of conference.

Correlations between time and achievement are presented in the following table:

TABLE No. VI
CORRELATION BETWEEN ACHIEVEMENT AND TIME

UNIT I		UNIT II		UNIT III	
*I	II	I	II	I	II
.66 ±.09	.60 ±.09	.45 ±.12	.13 ±.15	.61 ±.07	.41 ±.13
-.16 ±.15	.39 ±.15	.58 ±.11	-.22 ±.17	.55 ±.12	.47 ±.13
-.06 ±.15	.25 ±.14	.22 ±.14	-.52 ±.11	-.01 ±.15	-.02 ±.15

*In each unit, I refers to Experimental Group. II refers to Control Group.

The Rank-Difference formula,

$$\text{Rho} = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

was used. Rho was transmuted into r. The probable error of the coefficient of correlation was computed by formula:

$$\text{PEr} = .6745 \frac{1-r^2}{\sqrt{N}}$$

In the three groups there is a range in r from +.66 ±.089 in Sophomore experimental section, Unit I, to -.52 ±.11 in Senior control, Unit II. In general, with the exception of the Sophomore class, the correlation between time spent and

achievement, whether in study and conference, or in study and class-attendance, is low.

In the Sophomore class, with the exception of Unit II, Control, correlation is fairly high. In the Junior class, Experimental of Unit II and Unit III, there is a fairly significant correlation. In the Senior class, however, Unit II, Control represents the lowest correlation of all groups. Negative correlations here are in abundance.

With the exception of Unit I, Junior and Senior classes, correlation is higher for the experimental than for the control sections.

In considering the correlation between time and achievement, several factors enter to affect the results. In the Sophomore class, the subject was English Literature, in which a great amount of time was required for reading. In the first unit especially, where the perusal of novels for comparison was concerned, there was of necessity more time consumed, than in such a study as History of Education or Organization and Administration of Secondary Education.

Again, the possibility of the brighter students requiring less time, and the poorer more, must be considered. In examining the raw scores however, there seems to be a fair balance. In many instances, the individuals whose records throughout the course have been low, spent comparatively little time in study. In other cases, those who ordinarily make high marks spent time proportionate to achievement. This phase of the experiment has been a valuable check in many instances on the cause for unsatisfactory work on the part of apparently slow students.

The objective findings presented in this study represent the initial efforts of a small college to evaluate scientifically two methods of teaching. The subject-matter was not confined to any one field, nor to a complete course, but rather to particular and typical units of study in English and in Education. In discussing the opinion of participants, the evaluation is limited to the units selected for the experiment. Again, since the experience is confined to three units in each class, each

covering six weeks of study, opinions are virtually first impressions. Further experience with the new method would in all probability alter to some extent present attitudes.

In general, the instructors favor the principle underlying independent-study. Since the welfare of the individual is the prime concern, any method which offers opportunity for student advancement without detriment to those concerned, should receive consideration. In many instances the instructors observed loss in the beginning, owing to students' inability to make immediate readjustments to the novel situation. In such a subject as English Literature where appreciation stands forth as an important objective, the opinion is that individual study is less efficient than class discussion, at least in regard to students at early undergraduate level. The value derived from interchange of opinion seems lost to students who have little relish for literary selections, yet who can profit by the interpretations suggested by student-companions. Frequently through suggestions made informally in class, the tastes of such students are elevated, and a liking for good reading is cultivated. When the student in Literature is dependent upon optional conference, difficulties in interpretation are sometimes passed over in a procrastinating fashion, or lead to erroneous conclusions or antipathy for literary productions.

The main difficulties involved in English Literature which were encountered in independent-study, were the confusion resulting from research which led to various interpretations of the same passage and contradictory statements in regard to the authors studied, and in many instances, failure to recognize the need of guidance to be derived from conference. Immaturity of judgment, and indecision as to the best mode of attack on the problem in question were also noted. Such difficulties have, however, served to strengthen the instructors' conviction of the value of a method which places students in a position to think for themselves, and which develops a power, a self-reliance which can not be gained as readily by the old method. Intelligent use of the conference

would undoubtedly solve to some extent, the problems mentioned in regard to interpretation.

In History of Education, where students are beginning a new subject and presented a wide variation of historical background, it seems advisable to spend sufficient time in class instruction before placing them upon their own responsibility, to supply the all too frequently lacking apperceptive mass. A few meetings suffice to lay the foundation and to orient the group, after which independent-study becomes profitable.

In such a subject as "Organization and Administration of Secondary Education," there is little or no difficulty in following the entire course in independent-study. The subject lends itself well to unit organization, and since the field has been treated voluminously in texts and educational magazines, the student has a wider opportunity to explore the subject, unencumbered by class attendance. Students with even limited experience in the method have remarked that some topics ordinarily discussed at length in class could be covered by outside reading in order to allow for more important matters during the regular recitation period.

In each of the subjects then, in which the method was introduced, the instructors agreed that despite possible losses in subject-matter, occasioned by inability to readjust immediately, the power gained by the students was adequate compensation. Ability to attack problems, judgment in the choice of matter, self-reliance, a real technique of study are decided needs of the undergraduate. Limited as the experiment was in regard to time and subjects, instructors observed gains on the part of the students in connection with these desirable objectives. Had it been possible to conduct the entire group by independent-study instead of dividing the students, results, it is believed, would have been more favorable.

Instructors recognized many advantages in the unit organization of material. Although time and forethought are demanded before the units are distributed, the advantages to teachers and students repay the expenditure. When a sur-

vey of the field has been made prior to the teaching of the unit, and when the topics included have been thoroughly studied and properly sifted and organized, there is the assurance that the teacher is prepared for teaching and for conference. The student in turn is more easily motivated, knows definitely what is expected within a stated time and should, in consequence develop a technique destined to result in economy of time in learning.

In the organization of the units for History of Education, economy of time was noted especially. In covering Ancient, Medieval and Modern periods in unit form, there was sufficient time to include a study of national systems and the development of the American Secondary School,—units which have hitherto suffered more or less owing to the pressure of time. In addition to economy of time is the elimination of overlapping in subjects.

Student opinion was divided as to the value of class-instruction versus independent-study. Disfavor in the beginning was occasioned perhaps by inability to meet the new situation. By the close of the second unit, especially among Senior students in Education, preference for the new method was expressed in many instances.

Before the third unit was begun and before students were aware of the method to be adopted, the three classes were assembled by the instructors. A discussion as to the mode of attack which students believed most helpful for unit work was held. Student suggestion led to the formulation of a general plan of study. Briefly, the procedure in the estimation of students should be:

- I. A general survey of the matter to be covered in the unit.
- II. Elimination of topics which are familiar.
- III. Selection of sections which appear to demand most attention.
- IV. A survey of available literature.
- V. Estimation of amount of time at disposal.

- VI. Budgeting of time in view of desired readings.
- VII. A systematic reading of topics included in the unit.
- VIII. A final survey of the entire unit with special attention to points which are difficult.

In the senior group at the close of Unit II, before results of tests in Unit I were announced, the following questionnaire was distributed and collected before there could be interchange of opinion. Responses of thirty-eight students are incorporated into the questionnaire:

Replies to these questions will in no way affect rating

TWO METHODS OF PROCEDURE HAVE BEEN EMPLOYED

- I. CLASS INSTRUCTION
- II. INDEPENDENT-STUDY

From which method did you derive greater profit in regard to:

	<i>I</i>	<i>II</i>	<i>Equal</i>
1. Acquisition of knowledge?.....	34	3	1
2. Power of association?.....	28	10	0
3. Background?.....	28	8	2
4. Power of selecting material?.....	25	12	1
5. Development of judgment?.....	9	27	1
6. Independent-thinking?.....	4	33	1
7. Power of research?.....	2	34	1
8. Progress in initiative?.....	4	33	1
9. Self-reliance?.....	2	36	0
10. Which method held the greater interest?.....	29	7	2

If you were given your choice in Unit III, would you select

CLASS ATTENDANCE? or INDEPENDENT STUDY?

Student choice for Unit III was thirty-six to two in favor of class instruction. At the end of this unit, however, when the whole group had been exempt from class attendance, the voting stood twenty to eighteen, favor still for class. The two who had advocated the new method at the beginning of the unit had changed after their second trial at independent-study.

For the most part, students recognized the value in independent-study. The majority, wholly unaware of the objective evidence to the contrary, placed as the main objection, the lack of time. In reality, less time was spent by the new

method. In the reasons given for their choice of class instruction, many emphasized strongly the lack of social contact in exemption from class, and likewise expressed the desire for teacher guidance. Fear of missing something when half the class was in control was evident. Some confessed immaturity of judgment; some, despite the novelty of independent-study, adhered to class because of tradition, and others noted lack of opportunity to express one's self in class. Many other reasons for preference were given, but in general, they may be classified under the headings given in the questionnaire.

No extensive check in regard to students' attitude toward conference was recorded. From random questioning when application for help was made, there seemed to be a hesitancy in presenting difficulties. One reason given for procrastination in seeking help was the futility of submitting problems before adequate attention had been directed toward study of the case. What appeared beyond solution frequently required only effort and research on the part of the student. Recognizing this fact, many, according to their own statement, refrained from conference in the hope of mastering the situation singlehanded.

Another student-expression of attitude toward conference was indicative of fear lest the appeal be interpreted as inadequate preparation. Others claimed that they did not realize the need of direction until it was too late. Undoubtedly some were simply pleased at the freedom attending independent-study.

In weighing the objective and subjective evidence obtained from this experiment, it must be remembered that results may not be regarded as definitely conclusive in regard to either method. Objectively speaking, so far as actual achievement was concerned, the control groups on the whole showed greater gains, but required more time. It is impossible to determine from the data presented in this study how far the experimental group would have progressed had the same amount of time as that required of the control sections been given to preparation.

Observation of student-reaction to the units in this investigation has resulted in the opinion on the part of the faculty concerned, that there is an opportunity in the independent-study method for undergraduate students to develop both mentally and morally. In consequence, the decisive outcome of the experiment in the college in which it was undertaken is the resolution to incorporate independent-study into the regular teaching procedure of the future. This, it seems, is the most vital expression of the investigators' attitude toward independent-study versus class-instruction.

SUMMARY OF RESULTS

The results of this experiment may be summarized in accordance with the objectives defined prior to the study:

I. In this investigation in general, the control groups made higher achievement scores, but in so doing, required more time than the experimental sections. An estimate of the possibilities had the two groups spent an equal amount of time tends to favor the new method.

II. Judging from the results at the four levels of undergraduate work concerned in this experiment, independent-study may be used to advantage with Freshmen, Sophomores, Junior and Seniors. Students of comparatively low, average and superior ability may profit by the method.

III. In regard to time required by the student, the new method proved more economical, on the whole, than class-instruction. So far as instructors were concerned, counseling required less time than mass-teaching, and that with marked increase at Senior level.

PROBLEMS SUGGESTED BY THE EXPERIMENT

Experimental studies usually unearth a series of problems which are of value to research workers in the same and in kindred fields. Accordingly, the following suggestions are recorded as the outgrowth of this investigation:

- I. The need of a technique of study for undergraduate students. A controlled experiment, showing the effect of a "How to study course" upon progress in unit learning at college level, should be conducted in order to obtain objective data in regard to the value of proper study habits.
- II. An experimental study of the value of conference in independent-study is suggested.
- III. The relative value of unit organization of subject-matter at college level versus "Follow the text" plan should be determined by experiment.
- IV. The effect of exemption from class upon the scholarship of college students offers an opportunity for controlled experimentation in the two-way plan of registration.
- V. Independent-study versus class-instruction as it was attempted in this investigation, offers a wide and fertile field for further experimentation in the various subjects included in undergraduate work.

These suggestions are listed merely as suggestions of problems which invite the research worker to turn attention to the needs of experiment at college level. Further thought on these topics and analysis of the possibilities contained in such controlled experiment should result in improved methods of college teaching, which will, in turn, justify the claim which the undergraduate school holds as the link, the effective link which binds the secondary system to the Graduate School of America.

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VITA

Genevieve Ryan was born in Baltimore, Maryland, February 6, 1901. She received the degree of Bachelor of Arts from Saint Joseph's College, Emmitsburg, Maryland, June 1923; Master of Arts, from Mount Saint Mary's College, Emmitsburg, Maryland, 1930, and the degree of Doctor of Education from Johns Hopkins University, Baltimore, Maryland, June, 1932.

